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ABSTRACT

The primary contact which many non-native speakers have with the English language is visual. Thus, there exist many competent readers of English who are ignorant of pronunciation. In the past, English pronunciation has been taught in a case-by-case fashion, without regard to principles relating orthography to pronunciation. This is a report on one member of a group of Francophone subjects who worked on improving their pronunciation of English by applying ordered rules to standard English spellings in order to derive correct pronunciations. This subject performed rules on 25 classes of words representing English polysyllables ending in 31 different suffixes. Of 5,225 words he was asked to read, he made 2,941 errors at first, as compared with 296 errors after performing the rules on a few words in each class--an improvement of almost 90 percent. (Author)

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Rule Governed Pronunciation of English:
A Case Study in Generative Spelling

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I. Introduction.

This paper describes a technique for teaching the pronunciation of English polysyllables by means of a series of ordered rules.[1] Since English spelling often does not correspond to pronunciation in a direct way, it is often difficult for non-native speakers of English to pronounce an unfamiliar word correctly, when it is encountered in reading. This problem is ubiquitous among students of English as a foreign language who do not have the opportunity to live in an English-speaking community.

The technique described herein involves sets of ordered rules, each set pertaining to a different class of English words, where a class is defined by the suffix of the word. In Schnitzer (1974) the results of a pilot study designed to test such rules are discussed. Encouraged by the results of this study, I undertook a more extensive investigation in which twelve Belgian students of English were asked to apply ordered rules which related English orthographic form to pronunciation. Some fifty classes of words were worked on. One of the subjects completed 25 sets of words involving 32 different English suffixes. (This was the greatest number completed by anyone.) The present paper presents the results of his participation.

II. Method.

Subject P.G., a native speaker of French, and a student of Germanic in the second candidature at the Catholic University of Louvain (U.C.L.), was asked to read 5,225 English polysyllabic words, arranged according to suffix. He was then asked to perform sets of ordered rules to

between 10 and 40 words representative of each class, in order to derive the correct pronunciation. He was then retested on the original lists of words.[2] The number of errors before and after the performance of these rules was noted.

III. Results.

The results are reproduced in Table I below. Note that P.G.'s number of errors decreased from 2,941 to 296--an improvement of almost 90%.

Word Class	Number of words read	Number of Errors		
		1st reading	2nd reading	4 months later
-ous	239	61	23	
-ion	519	91	29	
-ent, -ence, -ency	485	153	18	33
-an	153	47	8	
-al	369	88	18	
-ia	109	44	6	
-cy	30	15	0	
-ant, -ance, -ancy	451	82	20	
-ic	428	169	34	46
-ary	66	18	2	
-ism	222	97	24	
-ize	139	39	10	
-ician	24	22	3	
-ment	363	90	18	
-most	27	12	1	
-able	505	140	25	
-ible	134	27	2	
-age	131	21	9	
-oid	42	31	1	
-ate	220	26	4	
-ly	147	31	9	
-graph, -gram, -scope	69	25	5	
-ty	303	92	17	
-itis	23	23	5	
-osis	27	12	5	
Totals:	5225	2941	296	

Table I

IV. Materials.

The following represents the instructions and general information Presented to P.G., followed by the sets of rules he performed.

A FEW PRELIMINARY REMARKS

1. In performing the rules contained in this book, you will often encounter the instructions 'Number the vowels'. This means ~~to~~ starting with the leftmost vowel of the suffix as number one, and to count each vowel of the word, going from Right to Left. So for example, the following two words with the suffixes -ion and -ate, respectively, would be numbered as follows:

C O N T R I T I O N
3 2 1

I N V E S T I G A T E
4 3 2 1

2. When you are told to assign stress, you are to assign primary stress. When instructed to assign primary stress to a certain vowel, place a mark like this (ˊ) over the vowel. Secondary stress (marked thus (ˋ)) will always be referred to as 'secondary stress'.

3. If you are instructed to assign stress to a vowel with a number which does not exist for a given word, assign the stress to the vowel with the next highest number. For example, if you are instructed to assign stress to vowel four of 'diagram', you cannot because the vowel with the highest number is the i, and it is vowel three.

D I A G R A M
3 2 1

Therefore, you should assign stress to vowel number three; it is the vowel with the next highest number to four.

4. The specific rules mentioned in the sets of rules always take precedence over the General Rules, should the rules be in conflict.

DEFINITIONS

after: immediately to the right of

before: immediately to the left of

beginning: leftmost, furthest to the left

between: 'between x and y' means that x is left of the item and y is right of the item.

digraph: 1) Two orthographic vowels combined to form a single vocalic nucleus of a syllable.

e.g. READ /riyd/
BOOT /buwt/
HAIR /heHr/
LAUGH /læf/, /la:f/

or

2) Two orthographic consonants combined to form a single pronounced consonant.

e.g. LAUGH /læf/, /la:f/
THING /θIŋ/
PHONY /fowniy/

ending: rightmost, furthest to the right

final: rightmost, furthest to the right

finally: occurring furthest to the right

follow: to occur immediately to the right of

followed by: immediately to the left of

initial: leftmost, furthest to the left

initially: occurring furthest to the left

precede: to occur immediately to the left of

preceded by: immediately to the right of

GENERAL RULES

I. General Rules for consonants:

b = /b/		n = /n/	
d = /d/		p = /p/	
f = /f/		r = /r/	
j = /j/ = /dž/		t = /t/	
k = /k/		v = /v/	
l = /l/		w = /w/	
m = /m/		z = /z/	

c = /s/ when it is just to the left of i, e, or y. (ceiling)
/k/ everywhere else (except when part of a digraph). (c ke)

g = /j/ when it is just to the left of i, e, or y. (gem)
/g/ elsewhere (except when part of a digraph). (gap)

h = is silent when final (except when part of a digraph).
/h/ elsewhere (except when part of a digraph).

s = /z/ between two vowels or between a vowel and an m or an n.
/s/ elsewhere.

x = /ks/ and it counts as two consonants.
/z/ when initial.

ph = /f/ and it counts as one consonant.

th = /θ/ or /ð/ and it counts as one consonant.

zh = /ž/ = /ʒ/ and it counts as one consonant.

sh = /š/ = /ʃ/ and it counts as one consonant.

ch = generally sounds like /č/ (= /tʃ/). Sometimes it sounds like /k/. It always sounds like /k/ when it is to the left of another consonant. It counts as one consonant.

ps = /s/ initially
/ps/ elsewhere

y = is a consonant except when final or when it comes between two consonants (or when otherwise noted). When y is a consonant, it sounds like /j/ (= /y/).

qu = counts as one consonant and is pronounced /kw/.

š, č, and ǰ count as single consonants wherever used herein.

II. General Rules for Vowels

a, e, i, o, and u are vowels. y is a vowel when final or when it comes between two consonants.

The following rules do not always work, but should serve as general guidelines.

1. Rules for u.

   i. /ə/ if followed by r + consonant (e.g. urt as in hurt).
      See rules for r-clusters below.

   ii. /ʌ/ if followed by two consonants. (luck)

   iii. /uw/ when preceded by r or l (unless i. or ii. applies).
      (rule)

   iv. /w/ when preceded by q. qu counts as one consonant. (quote)

   v. /yuw/ everywhere else. (mule)

2. Rules for r-clusters

These are the pronunciations of vowels when followed by r + consonant:

a (+ r + consonant) = /a/

o (+ r + consonant) = /o/

{i, e, u} (+ r + consonant) = /ə/

3. Guidelines for vowel pronunciation.

   i. These are generally the pronunciations of vowels when followed by two consonants:

   a = /æ/ i = /I/

   e = /ɛ/ o = /ɔ/, /a/

   ii. These are generally the pronunciations of vowels when followed by one consonant:

   a = /ey/ or /æ/ i = /ay/ or /I/

   e = /iy/ or /ɛ/ o = /ow/ or /ɔ/, /a/

iii. i followed by a vowel is /ay/ when stressed. See below for unstressed i.

4. Unstressed Vowels.

When vowels are not stressed, they are generally reduced. Unstressed e followed by a, i, or o is generally /iy/. Unstressed i followed by e, a, o, or u is generally /iy/. Unstressed e and i in other environments, and unstressed a and o in most environments are pronounced as /ə/.

5. y is a vowel when final or when it occurs between two consonants (or when otherwise noted). When y is a vowel, it generally follows the pronunciation rules for i.

6. Note: au = rewrite as /ɔ:/, whenever you see it.

7. Note: eu = /yuw/

III. Prefixes.

1. Invariant Group.

Although the following prefixes may be pronounced in different ways in different environments by different native speakers, you will never be incorrect if you use the following pronunciations.

bi-	/bay/	pre-	/priy/
di-, dy-	/day/	psych-	/sayk/
dis-, dys-	/dIs/	re-	/riy/
demi-	/dɛ̃mi/	retro-	/rɛ̃trow/
hemi-	/hɛ̃mi/	semi-	/sɛ̃mi/
iso-	/aysow/	sub-	/sʌb/
mis-	/mIs/	sur-	/sə(r)/
non-	/nɔn/, /nan/	tri-	/tray/
post-	/powst/	un-	/ʌn/

2. Variant Group.

For each of the following prefixes, use pronunciation (1) unless stress falls on the second syllable of the prefix. In the latter case, use pronunciation (2). For example, pronunciation (1) of the prefix demo- is /dɛ̃mə / and pronunciation (2) is /demɑ́/; thus we find the pair of English words /dɛ̃m ə krӕt/ -- /demɑ́krəsi/.

apo- (1) /ӕpə/; (2) /epɑ̃/, /epɑ́/

anti- (1) /ӕntay/; (2) /ӕntÍ/

auto- (1) /ɔ:tə/; (2) /ɔ:tɑ̃/, /ɔ:tɑ́/

demo- (1) /dɛ̃mə/; (2) /demɑ̃/, /demɑ́/

geo- (1) /j̃iyə/; (2) /j̃iyɑ̃/, /j̃iyɑ́/

inter- (1) /Întə(r)/; (2) /Intɑ̃(r)/

meta- (1) /mɛ̃tə/; (2) /mɛ̃tӕ/

micro- (1) /maykrə/; (2) /maykrɑ̃/, /maykrɑ́/

mono- (1) /mɔnə/, /manə/; (2) /mənɑ́/, /mənɑ́/

multi- (1) /mʌ́ltI/; (2) /mʌltÍ/

neo- (1) /niyə/; (2) /niyɑ́/, /niyɑ́/

para- (1) /pærə/; (2) /pərǽ/

phono- (1) /fowno/; (2) /fənɑ́/, /fenɑ́/

poly- (1) /pɔli/, /pali/; (2) /pəlÍ́/

super- (1) /s(y)ú́wpə(r)/; (2) /s(y)uwpɛ́(r)/

tele- (1) /tɛ̆lə/; (2) /təlɛ̆́/

3. Two more

ex- is usually pronounced /ɛ̆ks/; however, when it is just to the left of a stressed vowel it is pronounced /ɛ̆gz/. (e.g. extract /ɛ̆kstrǽkt/ -- exact /ɛ̆gzǽkt/).

hy- is pronounced /hay/ before -per, -po, and -dro.

SPECIAL RULES

I. Pronunciation of vowel followed by two consonants followed by ion, ian, ial, ia, ious, eous:

a + Consonant + Consonant	ion	a = /æ/
e + Consonant + Consonant	ian	e = /ɛ/
i + Consonant + Consonant	ial	i = /I/
o + Consonant + Consonant	e/i ous	o = /ɔ/, /a/
u + Consonant + Consonant	ia	u = /ʌ/

Note that if the first (leftmost) of the two consonants is r, the rules for r-clusters should be followed instead of the above rules.

II. Pronunciation of vowel followed by one consonant followed by ion, ian, ial, ia, ious, eous:

a + Consonant	ia	a = /e(y)/
e + Consonant	ial	e = /i(y)/
i + Consonant	e/i ous	i = /I/
o + Consonant	ion	o = /o(w)/
u + Consonant	ian	u = /(y)u(w)/*

III. When the i (or e) of ion, ious, eous, ian, ial, or ia remains in the last step in a set of rules (that is, if it has not been erased), it is pronounced as /iy/. The o, ou, or a following the i (or e) are pronounced as /ə/ regardless of whether the i

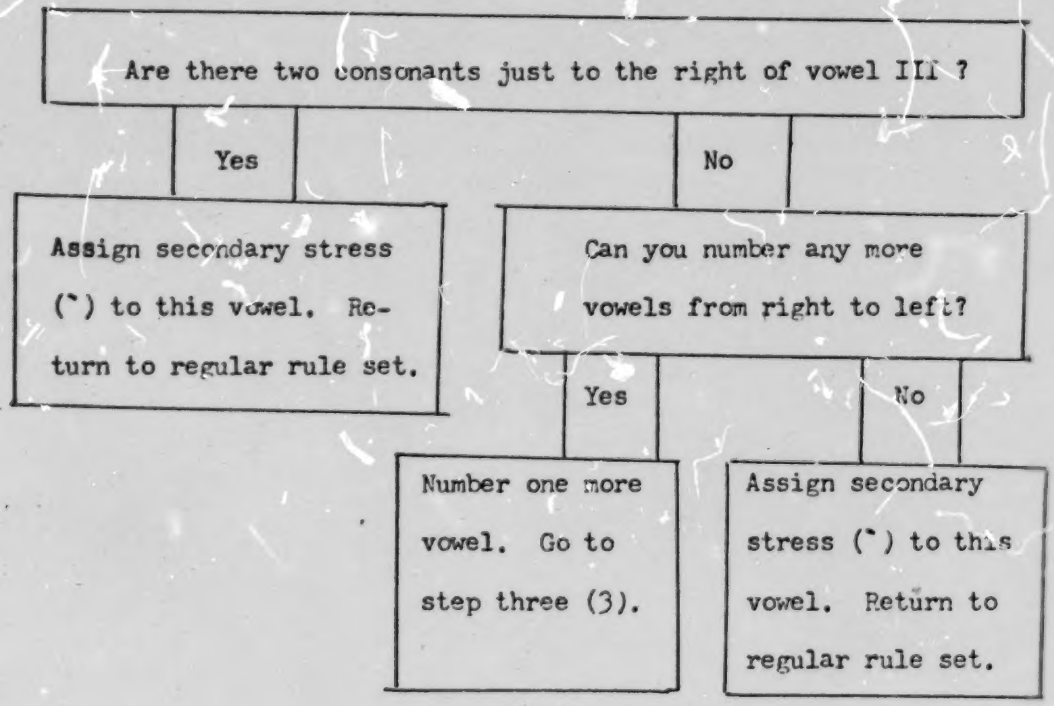
*See the rules for u.

has been erased or not.

IV. Do not pronounce the /y/'s and /w/'s in parentheses, when there is an r just to the right. (e.g. -arion is pronounced /ériyən/, not /éyriyən/).

SECONDARY STRESS ROUTINE

1. If possible, number three vowels using Roman numerals (e.g. I, II, III) from the one receiving stress, going from right to left, as usual. The vowel which has been assigned primary stress counts as I. If you cannot number the vowels because the word is too short, ignore the following, and return to the regular rule set.

2. 
Are there two consonants just to the right of vowel III ?
Yes
No
Assign secondary stress (ˋ) to this vowel. Return to regular rule set.
Can you number any more vowels from right to left?
Yes
No
Number one more vowel. Go to step three (3).
Assign secondary stress (ˋ) to this vowel. Return to regular rule set.

3. Are there two consonants just to the right of this vowel?

- Yes: Assign secondary stress (ˋ) to this vowel. Return to regular rule set.
- No: Can you number any more vowels from right to left?
  - Yes: Number one more vowel. Go to step three (3).
  - No: Assign secondary stress (ˋ) to this vowel. Return to regular rule set.

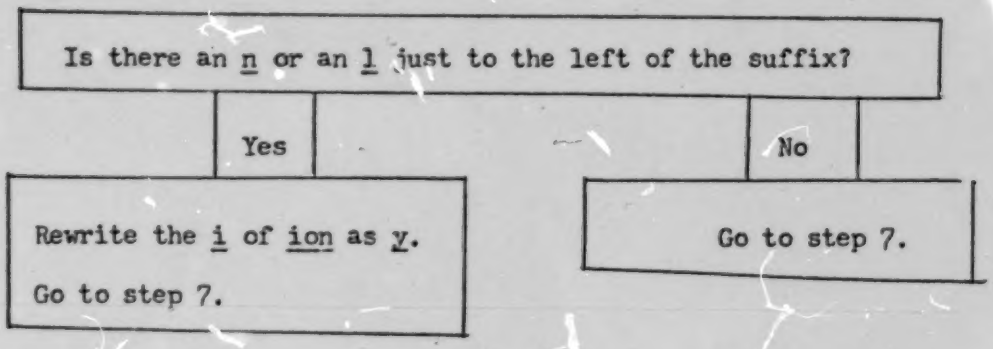
Note that this routine accounts for secondary stress only about eighty percent of the time.

-ion

1. Number the vowels.
2. Assign stress to vowel 2. Consult the Special Rules.
3. Is there a t just to the left of the suffix?
   - Yes → Is there an s just to the left of the t?
     - Yes → Rewrite the t as ch and erase the i of ion. Go to step 7.
     - No → Rewrite the t as sh and erase the i of ion. Go to step 7.
   - No → Go to step 4.
4. Is there an s just left of the suffix?
   - Yes → Is there a vowel just to the left of the s?
     - Yes → Rewrite the s as zh. Erase the i of ion. Go to step 7.
     - No → Erase the i of ion. Rewrite the s as sh. Go to step 8.
   - No → Go to step 5.

5. If there is a g just left of the suffix, erase the i of ion, rewrite the g as j, and go to step 7. Otherwise go to step 6.

6.



7. Perform the Secondary Stress Routine.

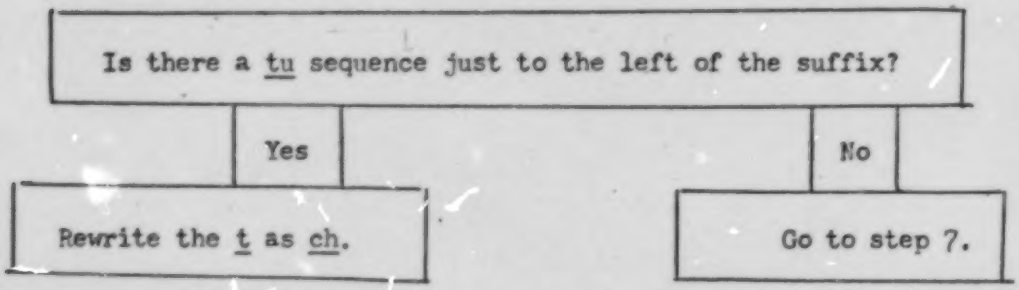
8. If vowel 4 is e, it is usually pronounced as /ē/ (except in r-clusters).

9. Pronounce the word.

-ous /əs/ (Adjectives)

1. Number the vowels.
2. If there are 2 consonants just left of the suffix, assign stress to vowel 2 and go to step 7; otherwise assign stress to vowel 3.
3. Is there an i just to the left of the suffix?
   - Yes → Is there a t just to the left of the i?
     - Yes → Consult the Special Rules . Rewrite the t as sh. Go to step 5.
     - No → Go to step 4.
   - No → Go to step 4.
4. Is there an e or an i just to the left of the suffix?
   - Yes → If there is a c to the left of the e or i, rewrite the c as sh.
     If there is a g to the left of the e or i, rewrite the g as j.
     Consult the Special Rules . Go to step 5.
   - No → Go to step 6.

5. Erase any i or e which is just to the right of a j or an sh.

6. 

7. Perform the Secondary Stress Routine.

8. If vowel 3 is stressed and it is e, then if vowel 2 is u, pronounce the e as /ɛ/ (unless it is in an r-cluster).

9. Check the General Rules for guidance for vowels not specified by the Special Rules.

10. Pronounce the word.

-al /əl/ (Adjectives)

1. If there is an ion sequence just left of the suffix, perform the -ion rules (Lesson 1) first, counting the i of ion as vowel 1, and then go to step 10 below.
2. Number the vowels.
3. Is there a consonant just to the left of the suffix?
   - Yes → Is this consonant a v or a y?
     - Yes → Place stress on vowel 2. If vowel 2 is i, it is pronounced /ay/. Go to step 8.
     - No → Are there 2 consonants just to the left of the suffix?
       - Yes → Place stress on vowel 2. Go to step 8.
       - No → Go to step 4.
   - No → Is vowel 2 a u?
     - Yes → If there is an s just left of the u, rewrite the s as zh; if there is a consonant just left of the zh, rewrite the zh as sh. If there is a t just left of the u, rewrite the t as ch. Go to step 5.
     - No → Go to step 5.

4. If the sequence cid appears just left of the suffix, assign stress to vowel 2; the i of cidal is pronounced /ay/.

5. If stress has not yet been assigned, assign it to vowel 3.

6. Is there an i just left of the suffix?

   Yes: Consult the Special Rules. If there is a t or a c just to the left of the i, rewrite the t or c as sh.

   No: Go to step 8.

7. Erase all i's which are just to the right of sh's.

8. Is there an ic sequence just left of the suffix?

Yes

Vowel 3 is pronounced as follows:

a: Pronounced as /ey/ if there is no consonant between vowel 2 and vowel 3 or if there is only one consonant and it is s.

If the a is followed by r + consonant (e.g. art), the a is pronounced as /a/. Otherwise the a is /æ/.

e: Pronounced as /iy/ if there is no consonant between vowel 2 and vowel 3 or if there is only one consonant and it is s or g.

If the e is followed by r + consonant (e.g. erg), then it is pronounced as /ə/.

In all other cases, the e is /ɛ/.

o: Pronounced as /ow/ if there is no consonant between vowel 2 and vowel 3 or if there is only one consonant and it is b.

If there is an r + consonant following the o (e.g. orb), the o is pronounced as /o/.

Otherwise the o is pronounced as /ɔ/, /a/.

u: Pronounced as /uw/ if there is an r just left of vowel 3.

Otherwise it is /yuw/.

If vowel 3 is i or y, pronounce vowel 3 as /I/.

No

Go to step 9.

9. Perform Secondary Stress Routine.

10. Check the General Rules. Pronounce the word.

-an /ən/ (Adjectives)

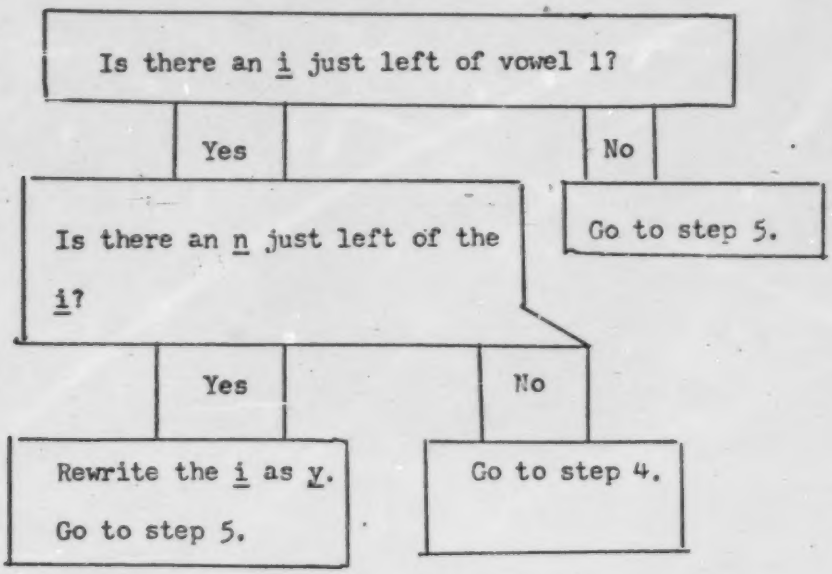
1. Number the vowels.
2. If there are 2 consonants just to the left of the suffix, then the stress is on vowel 2.
3. If vowel 2 is o, e, or u, then the stress is on vowel 2.
4. If stress has not yet been assigned, place it on vowel 3.
5. Is there an i just to the left of the suffix?
   - No → Go to step 7.
   - Yes → Consult the Special Rules.
     If there is a t or a c just to the left of the i, rewrite the t or c as sh.
     If there is a g just to the left of the i, rewrite the g as a j.
     Is there an s just to the left of the i?
     - No → Go to step 7.
     - Yes → If there is another s just to the left of the s, rewrite the ss as sh. If there is a vowel just to the left of the s, rewrite the s as zh.
6. Erase all i's which are just to the right of j's or sh's or zh's.

7. Perform the Secondary Stress Routine.

8. Consult the General Rules. Pronounce the word.

-ency /ensiy/, -ence /ens/, (Nouns)

-ent /ent/, (Adjectives, Nouns)

1. Number the vowels. If the word ends in -ment see the rules for -ment (Lesson 31).
2. If there are 2 consonants immediately to the right of vowel 2, assign stress to vowel 2. If vowel 2 is a or e, assign stress to vowel 2. Otherwise assign it to vowel 3.
3. 
Is there an i just left of vowel 1?
Yes
No
Go to step 5.
Is there an n just left of the i?
Yes
No
Rewrite the i as y. Go to step 5.
Go to step 4.
4. If there is a c, sc, or t just left of the i, rewrite the c, sc, or t as š.
5. Rules for stressed vowels:
   i. If vowel 3 is stressed, pronounce vowel 3 as follows: When vowel 3 is followed by r + consonant, see Rules for r-clusters ( ). Otherwise vowel 3 is as follows when stressed:

i = /I/

a is /ey/ when followed by 1 consonant + ie (e.g. atie)
or by a consonant + ye (e.g. avye).
Otherwise a is /æ/.

u = /uw/

o = /ɔ/

e is /iy/ when followed by a consonant + ie (e.g. edie),
or by 1 consonant + ye (e.g. enye).
Ctherwise e is /ɛ/.

ii. If there is an i just to the right of an š, erase the i.

iii. If vowel 2 is stressed, pronounce vowel 2 as follows:

c followed by r is /o/.

o followed by 2 consonants is /ɔ/, /a/.

o is /ow/ elsewhere.

u is /ə/ when followed by r + consonant (e.g. urg).

u is /ʌ/ when followed by 2 consonants.

u is /uw/ elsewhere.

e is /ə/ when followed by r + consonant (e.g. erg).

e is /ɛ/ when followed by 2 consonants.

e is /iy/ elsewhere.

a is /a/ when followed by r + consonant (e.g. art).

a is /æ/ when followed by r + vowel (e.g. arency).

a is /ey/ elsewhere.

i is /I/ when followed by 2 consonants.

i is /ay/ elsewhere.

6. Check the General Rules. Pronounce the word.

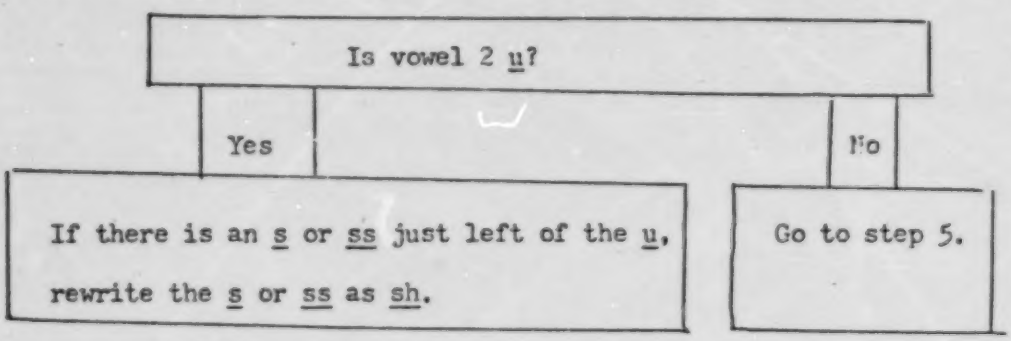
-ancy /ənsiy/, -ance /əns/, -ant /ənt/

1. Number the vowels.

2. If there are 2 consonants immediately to the right of vowel 2, assign stress to vowel 2. If there is a ur sequence just left of vowel 1, assign stress to the u (vowel 2). If there is a y or a w immediately to the left of vowel 1, assign stress to vowel 2. Otherwise assign stress to vowel 3.

3. If ge or gi is immediately to the left of vowel 1, rewrite the ge or gi as j, and go to step 5. Otherwise go to step 4.

4.



5. Perform the Secondary Stress Routine.

6. Vowel pronunciations are only partially predictable, and only by a very complicated set of rules. But consult the General Rules for guidance. Then pronounce the word.

-ic /ek/ (Adjectives)

1. Number the vowels; count y as a vowel for vowel 2.
2. Assign stress to vowel 2.
3. Perform Secondary Stress Routine.
4. Pronunciation of vowel 2:

   a: Pronounced as /ey/ if there is no consonant between vowel 1 and vowel 2 or if there is only one consonant and it is s.

   If the a is followed by r + consonant (e.g. art), the a is pronounced as /a/.

   In all other cases, the a is /æ/.

   e: Pronounced as /iy/ if there is no consonant between vowel 1 and vowel 2 or if there is only one consonant and it is s or g.

   If the e is followed by r + consonant (e.g. erg), then it is pronounced as /e/.

   In all other cases, the e is /ɛ/.

   o: Pronounced as /ow/ if there is no consonant between vowel 1 and vowel 2, or if there is only one consonant and it is b.

   If there is an r + consonant following the o (e.g. orb), the o is pronounced as /o/.

   Otherwise the o is pronounced as /ɔ/, /a/.

u: i. /ʌ/ if followed by 2 consonants.

ii. Pronounced as /uw/ if there is an r just left of vowel 2, unless step i. applies.

iii. Otherwise the u is pronounced as /yuw/.

i, y : If vowel 2 is i or y (see step 1 above), pronounce vowel 2 as /I/.

5. Pronounce the word.

-ate (Verbs: /eyt/) (Nouns, Adjectives: /ət/)

These words are predictable only when there are at least 3 syllables in the word (i.e. you must be able to number at least 3 vowels in step 2 below).

1. If there is an -icn sequence just left of the suffix, perform the -ion rules (Lesson 1) on the -ion word counting the i as vowel 1, and then go to step 7. Otherwise go to step 2.
2. Number the vowels.
3. Assign stress to vowel 3.
4. If there is a ci or ti sequence just left of the suffix, change the c or t to sh.
5. Rules for vowel 3:

   a: When followed by r + consonant, it is /a/.
   Otherwise it is /æ/.

   i: When followed by a vowel it is /ay/.
   Otherwise it is /I/.

   u: When followed by 2 consonants, it is /ʌ/.
   Otherwise it is /yuw/.

   e: If there is a consonant between vowel 1 and vowel 2, the e is pronounced as /ɛ/.
   If there is no consonant, it is /iy/.

   o: If it is followed by r, it is pronounced as /o/.
   If it is not followed by r, and there is a consonant between vowel 1 and vowel 2, the o is pronounced as /ɔ/, /a/.

If there is no consonant between vowel 1 and vowel 2, it is pronounced as /ow/.

6. Rules for vowel 2:

If there is a consonant in between vowel 1 and vowel 2, vowel 2 is pronounced as /ə/, unless it is a u.

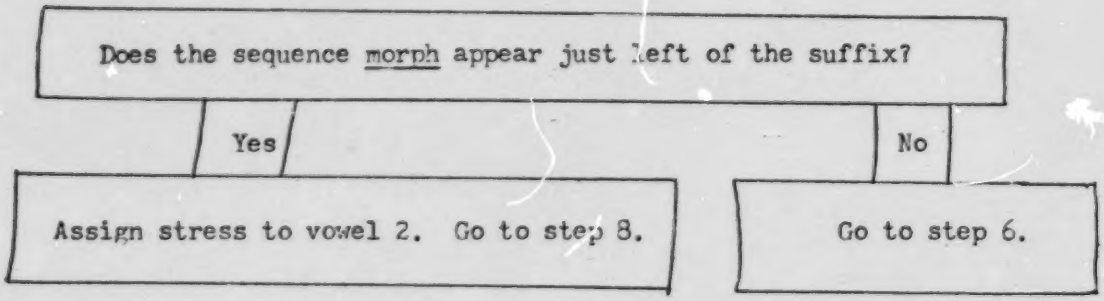
When vowel 2 is u, it is pronounced /ə/ before 2 consonants. Otherwise it is /yuw/.

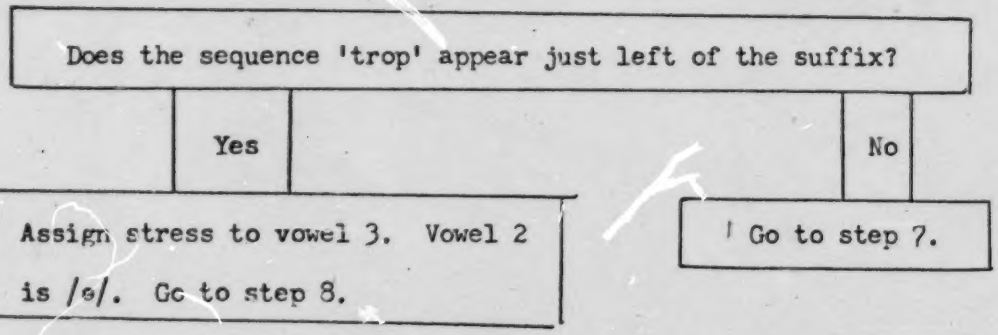
Otherwise, if there is no consonant between vowel 1 and vowel 2, then vowel 2 is /iy/. If there is an intervening consonant, vowel 2 is /ə/.

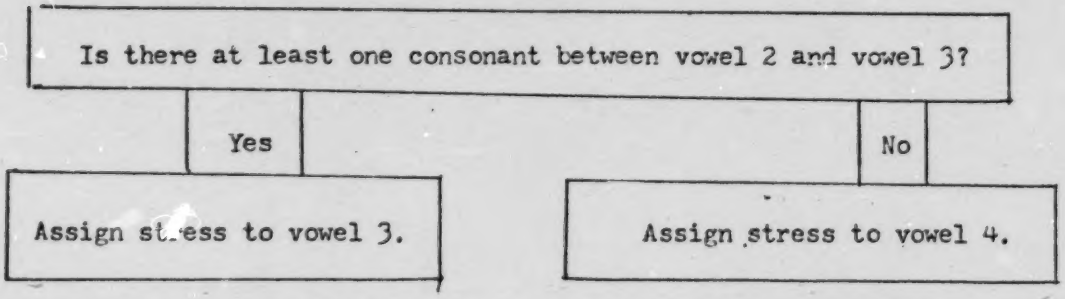
7. If the word is a verb, pronounce the suffix as /eyt/. Otherwise it is /ət/.

8. Pronounce the word.

-ism /Izəm/ (Nouns)

1. If there is a real English adjective ending in al just to the left of the suffix -ism, perform the -al rules (Lesson 3), counting the a of -al as vowel 1; pronounce the -al word normally, adding /Izəm/ at the end, and ignore the rules below. Otherwise go to step 2.
2. If there is a real English adjective ending in an just to the the left of the suffix -ism, perform the -an rules (Lesson 4), counting the a of -an as vowel 1; pronounce the -an word normally, adding /Izəm/ at the end, and ignore the rules below. Otherwise go to step 3.
3. If there is an actual English word ending in ion just to the left of the suffix -ism, perform the -ion rules (Lesson 1), counting the i of -ion as vowel 1; pronounce the -ion word normally, adding /Izəm/ at the end, and ignore the rules below. Otherwise go to step 4.
4. Number the vowels.
5. 

6. 

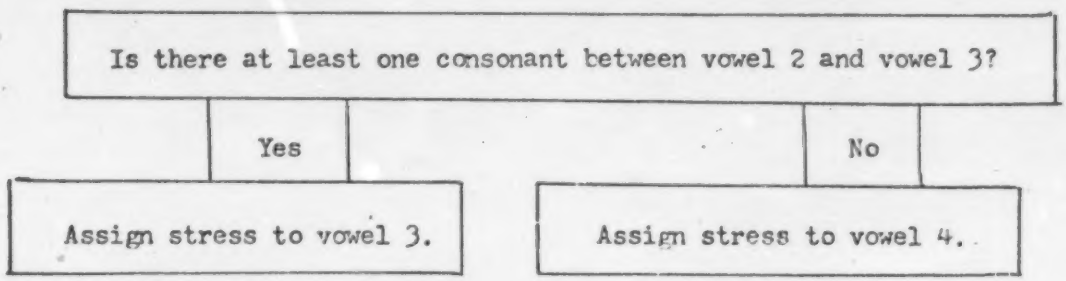
7. 

8. Vowels cannot be predicted in general, but check the General Rules for guidelines.

9. Ch just left of the suffix -ism is pronounced /k/.

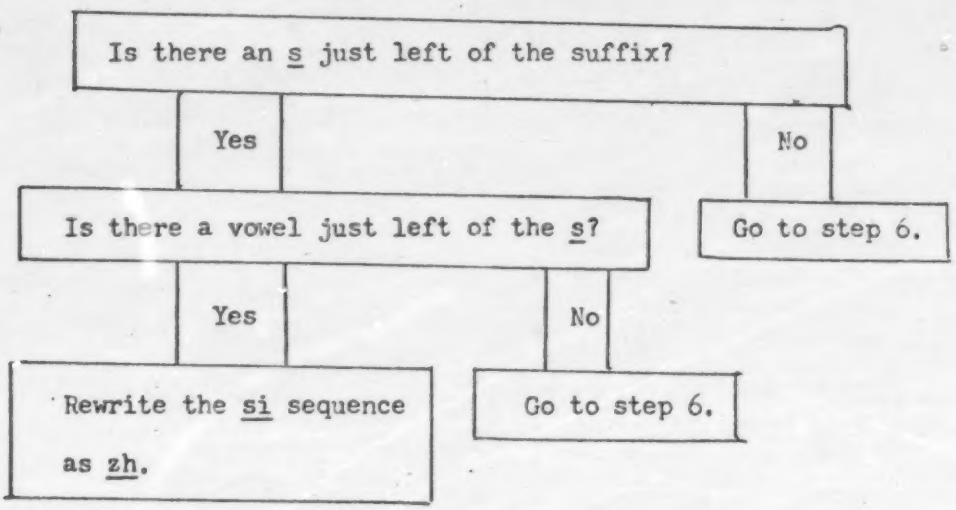
10. Pronounce the word.

-ize, -ise /ayz/ (Verbs)

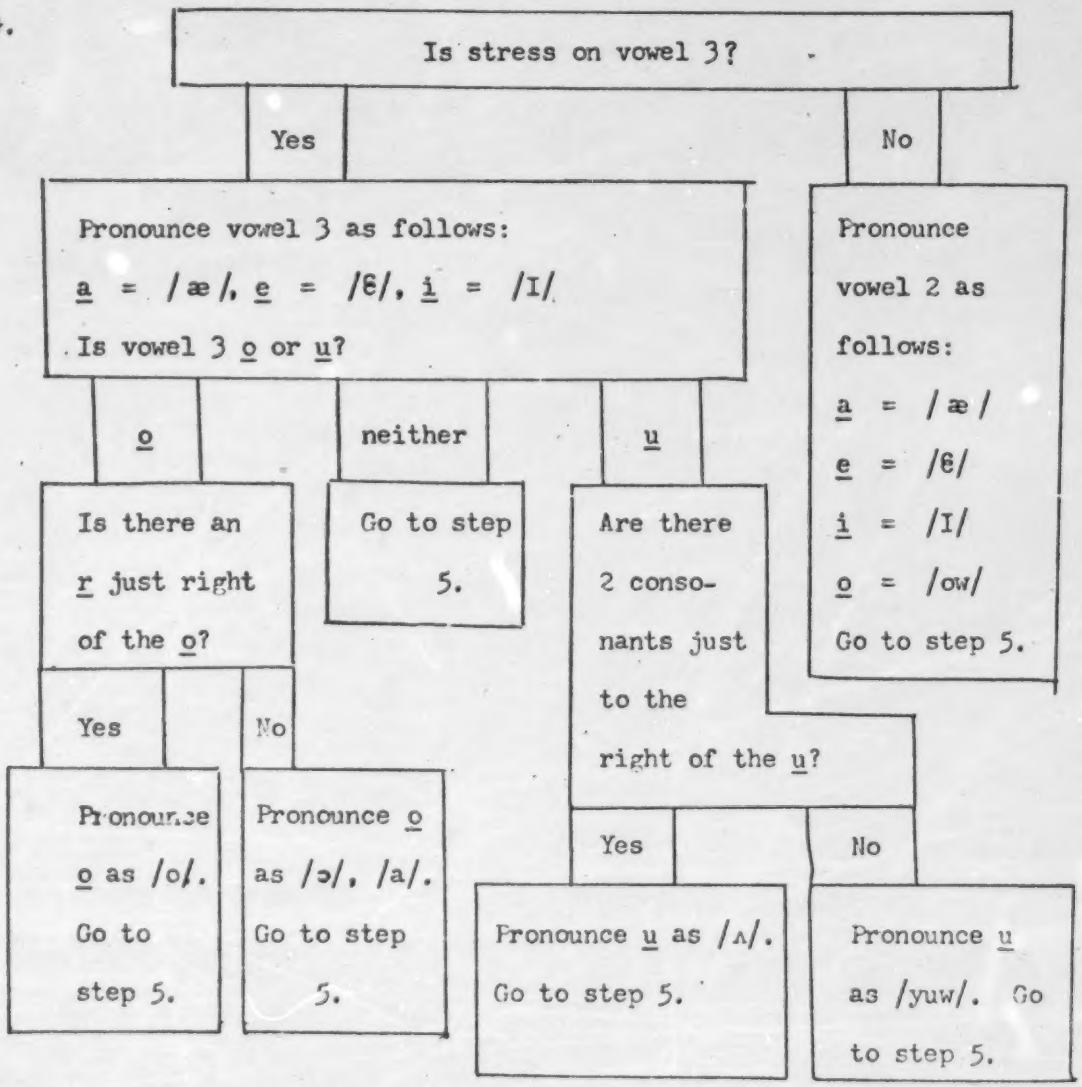
1. If there is a real English Adjective ending in al just to the left of the suffix, perform the -al rules (Lesson 3), counting the a of -al as vowel 1. Pronounce the -al word normally, adding /ayz/ at the end, and ignore the rules below. Otherwise go to step 2.
2. If there is a real English word ending in an just to the left of the suffix, perform the -an rules (Lesson 4), counting the a of -an as vowel 1. Pronounce the -an word normally, adding /ayz/ at the end, and ignore the rules below. Otherwise go to step 3.
3. Number the vowels.
4. 

5. Vowels cannot be predicted, but check the General Rules for some guidelines.
6. If there is an s just left of the suffix, it is pronounced /s/.
7. Pronounce the word.

-ia (Nouns)

1. Number the vowels.
2. Assign stress to vowel 2. Consult the Special Rules.
3. If there is a c or a t just left of the suffix, rewrite the c or the t plus the following i (ci or ti) as sh.
4. If there is a g just left of the suffix, rewrite the g and the following i (gi) as j.
5. 
Is there an s just left of the suffix?
Yes
No
Is there a vowel just left of the s?
Go to step 6.
Yes
No
Rewrite the si sequence as zh.
Go to step 6.
6. Perform the Secondary Stress Routine. Consult the General Rules. Pronounce the word.

-ary /ɛriy/, /ɛriy/, /riy/ (Adjectives)

1. If ion is immediately to the left of the suffix, perform the rules for -ion (Lesson 1), counting the i of -ion as vowel 1. Pronounce the word ending in -ion normally, but with -ary at the end. Ignore the rest of the rules below.
2. Number the vowels. If there are 2 consonants just left of the suffix, assign stress to vowel 2.
3. If stress has not yet been assigned, assign it to vowel 3.
4. 
Is stress on vowel 3?
Yes
No
Pronounce vowel 3 as follows:
a = /æ/, e = /ɛ/, i = /I/
Is vowel 3 o or u?
Pronounce vowel 2 as follows:
a = /æ/
e = /ɛ/
i = /I/
o = /ow/
Go to step 5.
o
neither
u
Is there an r just right of the o?
Go to step 5.
Are there 2 consonants just to the right of the u?
Yes
No
Pronounce o as /o/. Go to step 5.
Pronounce o as /ɔ/, /a/. Go to step 5.
Pronounce u as /ʌ/. Go to step 5.
Pronounce u as /yuw/. Go to step 5.

5. Pronounce vowel 1 as /ə/.

6. Perform the Secondary Stress Routine.

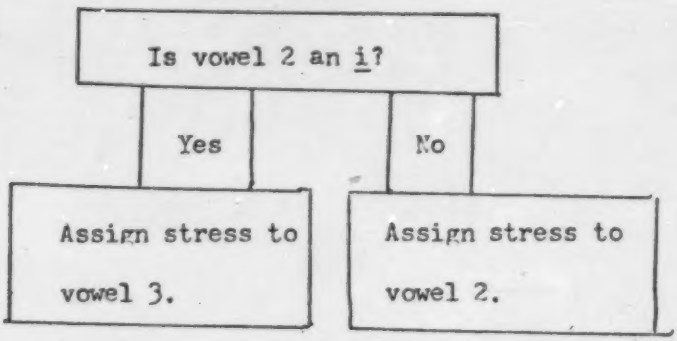
7. Pronounce the word.

-ible (/əbəl/) (-ibil (/əbíl/) in compounds)

1. Number the vowels.

2. If there are 2 consonants just left of the suffix, assign stress to vowel 2 and go to step 5. Otherwise go to step 3.

3.



4. If stress is on vowel 3, pronounce vowel 3 as follows:

e = /ɛ/

o = /ɔ/, /a/

5. If stress is on vowel 2, pronounce 2 as follows:

i) If vowel 2 is in an r-cluster (i.e. vowel + r + consonant), use the r-cluster rules.

ii) Otherwise:

a = /æ/

e = /ɛ/

i = /I/

o is /ow/ before 1 consonant.

o is /ɔ/, /a/ before 2 consonants.

u is /yuw/ before 1 consonant.

u is /ʌ/ before 2 consonants.

6. Check the General Rules. Pronounce the word.

-cy /sI/, /siy/ (Nouns)

1. If the word ends in -ancy or -ency, ignore the following and instead apply the appropriate rules for words ending in -ancy (Lesson 6) or -ency (Lesson 5).
2. Number the vowels. Remember that y is a vowel here, since it is final.
3. If there are 2 consonants immediately to the right of vowel 3, assign stress to vowel 3.
4. If stress has not as yet been assigned, assign it to vowel 4.
5. Rules for vowels:

   If vowel 4 is stressed, then vowel 4 is pronounced as follows:

   i = /I/

   a = /æ/

   e is /ə/ when followed by r

   e is /ɛ/ elsewhere

   If vowel 3 is stressed, then vowel 3 is pronounced as follows:

   a is /a/ when followed by r

   a is /æ/ elsewhere

   o is /ɔ/, /a/ when followed by 2 consonants

   o is /ow/ elsewhere

   e is /ɛ/

   i is /ay/

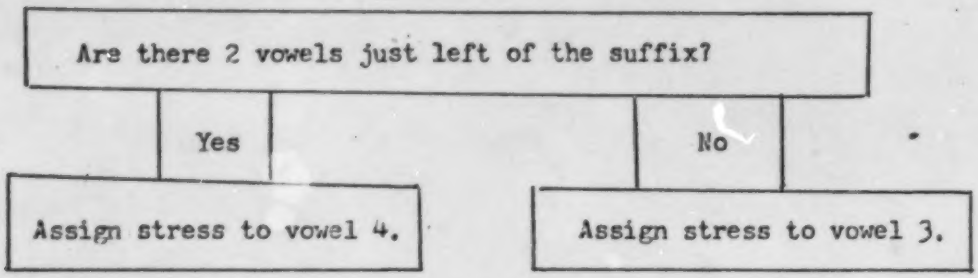
6. Pronounce the word.

-ician /Išən/ (Nouns)

1. Number the vowels.
2. Assign stress to vowel 1.
3. Perform the Secondary Stress Routine.
4. Consult the General Rules. Pronounce the word.

-graph /graf/, /græf/, -gram /græm/, -scope /skowp/

(Nouns)

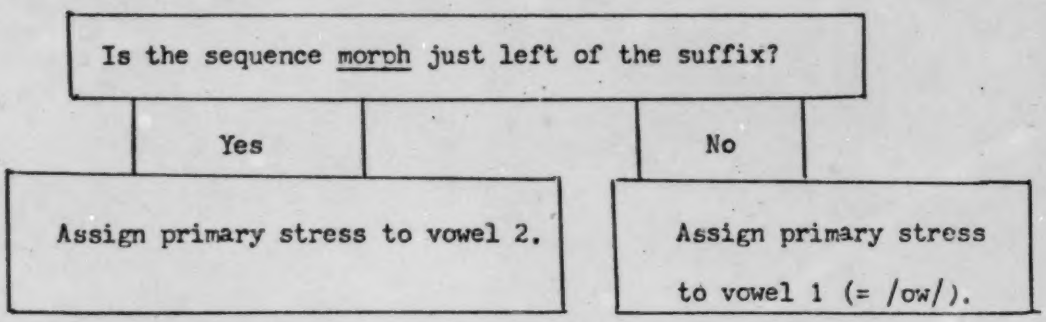
1. Number the vowels, counting y as a vowel.
2. 

3. Check the General Rules, however the vowels of these words can generally be predicted only with very complex rules.
4. Pronounce the word.

-itis /ʌytes/, /aytəs/ (Nouns)

1. Number the vowels.
2. Assign stress to vowel 1.
3. Perform the Secondary Stress Routine.
4. Check the General Rules.
5. Pronounce the word.

-osis /owses/, /eses/ (Nouns)

1. Number the vowels. Count y as a vowel.
2. 

3. If vowel 2 is stressed, vowel 2 is pronounced /o/, and vowel 1 is pronounced as /ə/.
4. Perform the Secondary Stress Routine.
5. Consult the General Rules.
6. Pronounce the word.

-able /ebel/ (Adjectives) (-abil /ebil/ in compounds)

1. Is there an actual English word just left of the suffix?

Yes	No
The suffix is neutral. Pronounce the word to the left of the suffix normally, adding /ebel/ at the end. If there are two pronunciations of the English word to the left of the suffix--one for a verb and one for a noun--choose the verbal form.	Go to step 2.

2. If you have already performed step 1 twice, go to step 3. If you have performed step 1 only once:

   a) If there is an i just left of the suffix, change it to y (vowel) and go back to step 1.

   b) If there is no i just left of the suffix, place an e just left of the suffix and go back to step 1.

3. If you have added or changed any letters, restore the word to its original spelling. Does the word begin with un or in?

Yes	No
Ignore the un (/ʌn/) or in (/In/) and go to step 1 (still ignoring the un or in); if this is the second time you have performed step 3, go to step 4.	Go to step 4.

4. Number the vowels. Place stress on vowel 3 (vowel 2 if there is no vowel 3 or if vowel 3 is part of initial un or in, which we ignore for stress placement.).

5. Rules for vowels:

   i. If stress is on vowel 2, pronounce vowel 2 as follows:

   a = /æ/

   e = /ɛ/

   o = /ow/

   u is /ʌ/ if followed by 2 consonants; otherwise u is /yuw/.

   i is /ay/ if followed by a; otherwise it is /I/.

ii. If stress is on vowel 3, pronounce vowel 3 as follows:

a = /æ/

o = /ɔ/, /a/

e is /ɔ/ if followed by r + consonant (e.g. ert); otherwise e is /ɛ/.

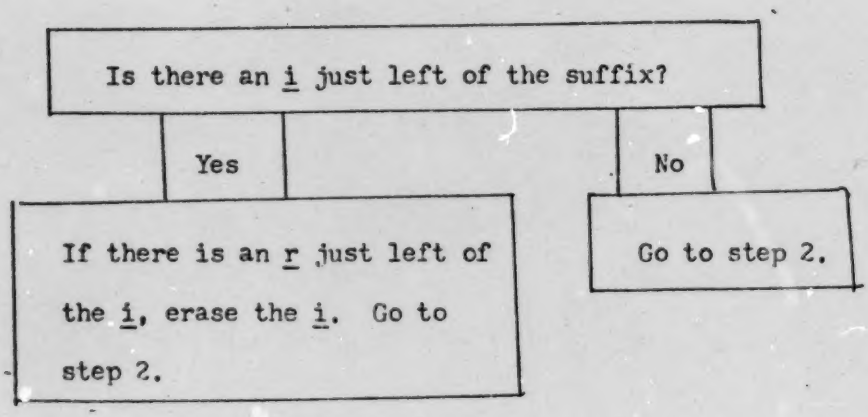
i is /I/ if followed by a consonant; when followed by a vowel it is /ay/.

u is /ʌ/ when followed by 2 consonants. Otherwise it is /yuw/.

6. Pronounce the word.

-age /ɘǰ/ (Nouns)

1.



2. If there is a real English word just left of the suffix, the suffix is neutral; pronounce the word normally, adding -age (/ɘǰ/) at the end; otherwise go to step 3.

3. Number the vowels. Assign stress to vowel 2.

4. Rules for pronunciation of vowel 2:

   a: if followed by 2 r's (i.e. arr), it is pronounced /æ/. if followed by r + consonant (e.g. arv), it is pronounced /a/. Otherwise it is /ə/.

   e: /ɛ/

   i: /I/

   u: if followed by 2 consonants (e.g. upt), it is pronounced /ʌ/. Otherwise it is /yuw/.

   o: not predictable

5. Pronounce the word.

-oid /oyd/ (Adjectives, Nouns)

1. Number the vowels. Count y as a vowel in these words.
2. If there are 2 consonants just left of the suffix, stress is on vowel 2.
3. If stress has not been assigned, place it on vowel 3.
4. Rules for vowels:

   i) If vowel 2 is stressed, then vowel 2 is pronounced as follows:

      o = /ɔ/, /a/

      u = /ʌ/

      a = /æ/

      i = /I/

      e is /ɛ/ if followed by 2 consonants. Otherwise, it is /iy/.

      y = /ay/.

   ii) If vowel 3 is stressed then vowel 2 is pronounced as follows:

      a = /ə/

      o = /ə/

      e = /ə/

      u = /yuw/

      i is /iy/ if it is just left of a vowel.
      Otherwise i is /ə/.

iii) If vowel 3 is stressed then vowel 2 is pronounced as follows:

a = /æ/

u = /uw/

e is pronounced as /ɛ/ when followed by 2 consonants.

Otherwise it is /iy/.

o is pronounced as /ɔ/,/a/ when followed by 2 consonants.

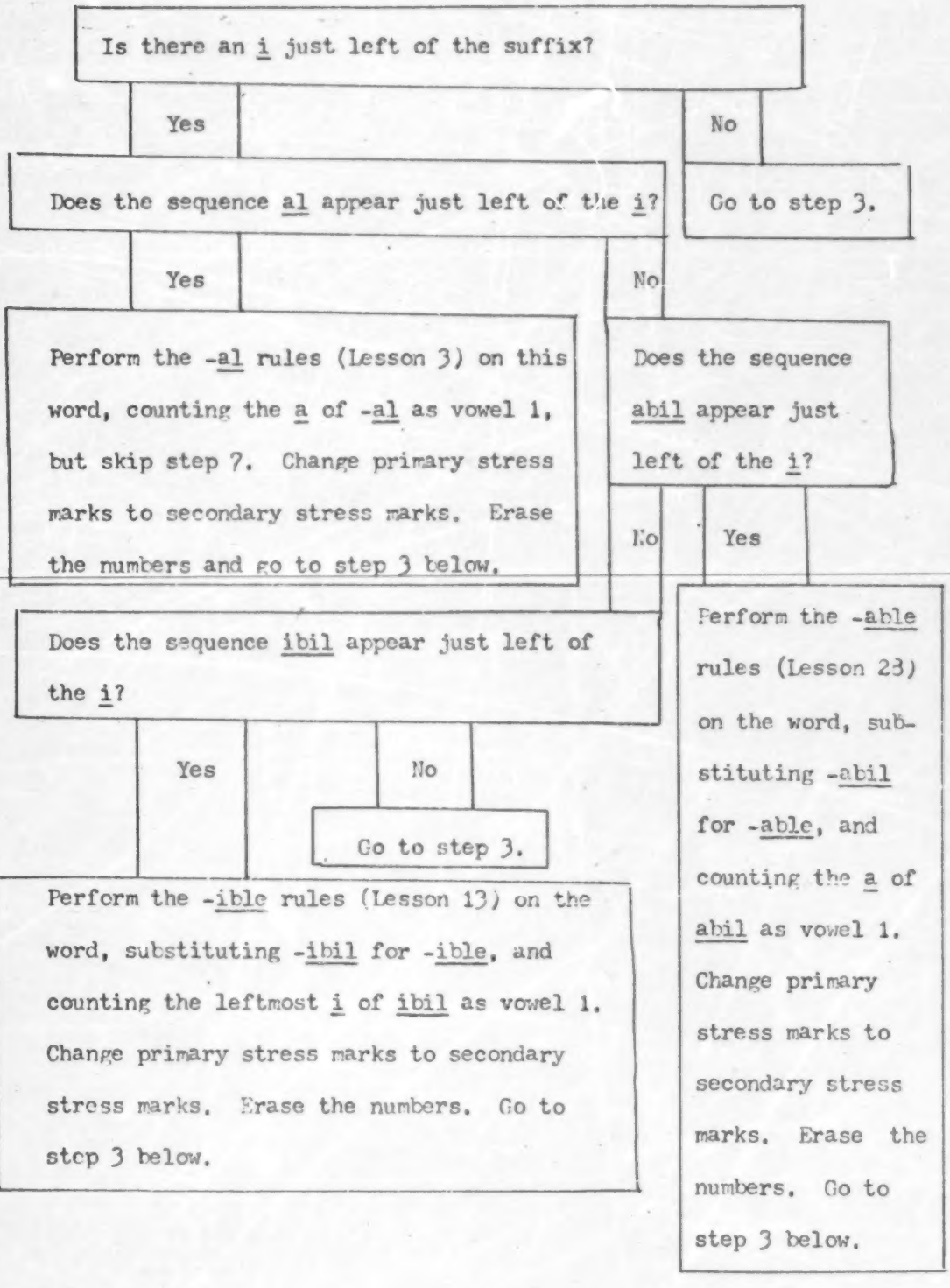
Otherwise it is /ow/.

5. Pronounce the word.

-ty /tI/, /tiy/ (Nouns)

1. If there is a real English word just to the left of the suffix, then the suffix is neutral, so pronounce the word normally, adding /tiy/ at the end. If there is no such real word, go to step 2.

2.


Is there an i just left of the suffix?
Yes
No
Does the sequence al appear just left of the i?
Go to step 3.
Yes
No
Perform the -al rules (Lesson 3) on this word, counting the a of -al as vowel 1, but skip step 7. Change primary stress marks to secondary stress marks. Erase the numbers and go to step 3 below.
Does the sequence abil appear just left of the i?
No
Yes
Does the sequence ibil appear just left of the i?
Perform the -able rules (Lesson 23) on the word, substituting -abil for -able, and counting the a of abil as vowel 1. Change primary stress marks to secondary stress marks. Erase the numbers. Go to step 3 below.
Yes
No
Go to step 3.
Perform the -ible rules (Lesson 13) on the word, substituting -ibil for -ible, and counting the leftmost i of ibil as vowel 1. Change primary stress marks to secondary stress marks. Erase the numbers. Go to step 3 below.

3. Number the vowels. Place primary stress on vowel 3.

4. Rules for the pronunciation of vowel 3:

   a: if followed by r + consonant (e.g. art), it is pronounced as /a/.
   if followed by a consonant, it is /æ/.
   if followed by a vowel, it is pronounced /ey/.

   e: if followed by r + consonant (e.g. erg), it is pronounced as /ə/.
   if followed by a consonant, it is pronounced /ɛ/.
   if followed by a vowel, it is /iy/.

   i: if followed by r + consonant (e.g. irn), it is pronounced as /ə/.
   if followed by a consonant, it is pronounced /I/.
   if followed by a vowel, it is pronounced as /ay/.

   o: if followed by r, it is pronounced as /o/.
   otherwise it is pronounced as /ɔ/, /a/.

   u: if preceded by r, it is pronounced as /uw/.
   otherwise it is /yuw/.

5. Vowel 2 is pronounced as /ə/.

6. Perform the Secondary Stress Routine if secondary stress has not been assigned.

7. Pronounce the word.

-ment /ment/

(Nouns (and Adjectives pronounced like Nouns with the same spelling))

1. Number the vowels.
2. If there is an a just left of the suffix, place stress on vowel 3 and go to step 5.
3. Is there an English word just to the left of the suffix?

   Yes: The suffix is neutral. Pronounce the word normally, adding /ment/ at the end.

   No: Go to step 4.
4. If stress has not yet been assigned, perform the rules for -ent words (Lesson 5), and ignore step 5 below.
5. Vowel 3 is predictable according to the General Rules.
   Vowel 2 is /e/. Consult the General Rules and pronounce the word.

-most /mowst/

1. Do not number the vowels.
2. Stress is assigned to the leftmost syllable in the word. Most of the graphic material left of the suffix represents English words. When a real English word does appear left of the suffix, it should be pronounced as usual, with /mowst/ at the end.

-ly /lI/, /liy/ (Adverbs and Adjectives)

1. Is there a real English word to the left of the suffix?

   - Yes → The suffix is neutral. Pronounce the word to the left of the suffix normally, adding -ly at the end.
   - No → Go to step 2.

2. Is there an ab sequence or an ib sequence just left of the suffix?

   - Yes → Change the y in -ly to e. Perform the rules for -able (Lesson 28) or -ible (Lesson 13); but instead of pronouncing the suffix as /əbəl/, pronounce it as /əbliy/.
   - No → Go to step 3.

3. Is the sequence al found just to the left of the suffix?

   - Yes → Delete the al sequence. Go to step 5.
   - No → Go to step 4.

4. If there is an i just left of the suffix, change the i to y.

5. Once the above changes have been made, the suffix is neutral. Pronounce the word to the left of the suffix normally, adding /liy/ or /lI/ at the end.

V. Discussion.

There were twelve subjects involved in testing the rules presented above. A total of about 50 sets of rules were tested; however, P.G. alone covered as many as 25. Results of fifteen sets of rules which other subjects worked on are currently being tabulated and being subjected to a control study involving francophone subjects who read the words and who perform a repetition exercise, but who do not perform the rules. Results of this controlled study are needed in order to ascertain the significance of results of the kind presented in Table I above. Nevertheless, the results presented in this paper are suggestive of the usefulness of ordered rules in teaching English pronunciation to non-native speakers whose primary contact with the language is through reading.

What is of particular interest is the fact that when P.G. was retested a second time on two of the word classes (this time four months after his application of the rules), his results were still greatly improved, compared to his first performance. (See the fifth column of Table I for these data for the words ending with -ent, -ence, -ency, and -ic.) Thus the method seems to produce long-term results.

Notes

[1]This research was supported in part by a Fulbright-Hays research fellowship and in part by a grant from the College of Liberal Arts, The Pennsylvania State University. I am indebted to Jacques Van Roey, Dorothy Moore Deflandre, Pierre Godin, Lisa Berdann Schnitzer, Thomas Magner, and Andi Draizar for facilitating this project in various ways.

[2]Only regular forms were included in the lists. All exceptions to the rules were excluded.

Reference

Schnitzer, Marc L., "Applied Generative Phonology: A Methodology for Teaching Pronunciation", IRAL XII/4 (1974), 289-305.